FEDERAL AVIATION AGENCY

FAA AVIATION NEWS

APRIL 1967

A12EU

Piaggio
P-80

TYPE CERTIFICATE DATA SHEET NO. A12EU

This data sheet, which is a part of Type Certificate No. A12EU, prescribes conditions and limitations under which the product for which the Type Certificate was issued meets the airworthiness requirements of the Civil Air Regulations.

Type Certificate Holder — Industrie Aeronautiche e Meccaniche
Rinaldo Piaggio S.p.A. (formerly Piaggio & Co.)
Genoa, Italy.

I. Piaggio-Douglas Model PD-808 (Transport aircraft), approved November 29, 1965.

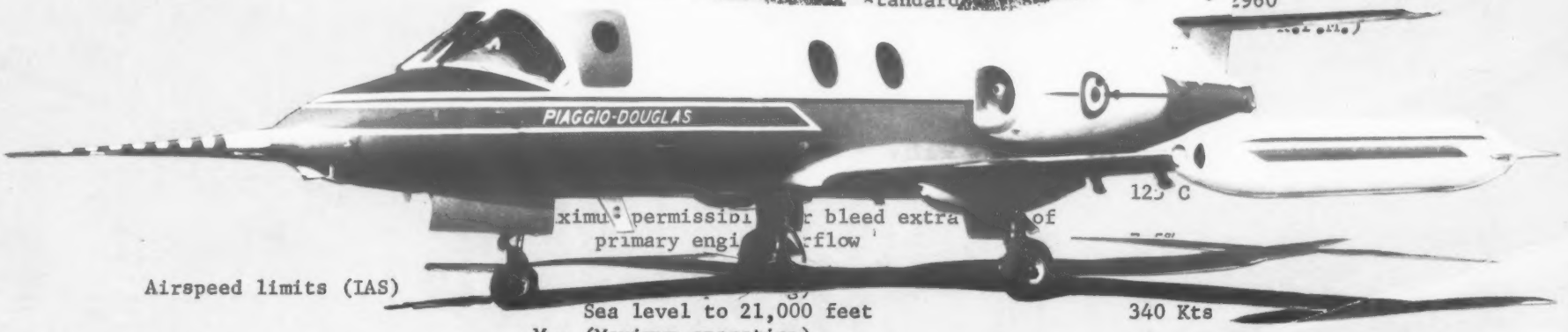
Engines — 2 Bristol Siddeley Viper 525 turbine engines

Fuel — Aviation Kerosene Specification:
American — A.S.T.M. D1655/64T Jet A or A-1, MIL-J-5615 Type JP1
British — D. Eng.R.D. 2482 or 2494, AVTUR 50

Aviation Wide-Cut Specification:
American — A.S.T.M. D1655/64T Jet B, MIL-J-5624 Type JP4
British — D. Eng. R.D. 2486, AVTAG

Oil — ESSO TJ.15 and ESSO Extra 274
ENCO TJ.15 and ENCO [illegible] 256
Mobil Jet II, Castrol 98

Engine limits — Take-off static thrust standard day [illegible], 12960
[illegible] standard [illegible] 12960
[illegible]



[illegible] 125° C

Maximum permissible [illegible] bleed extraction of primary engine airflow

Airspeed limits (IAS)

	Sea level to 21,000 feet	340 Kts
M_{MO}	(Maximum operating)	
	21,000 feet and above	M = 0.75
V_A	(Maneuvering)	
	16,500 lb. gross weight	260 Kts
	15,000 lb. gross weight	246 Kts
	13,000 lb. gross weight	230 Kts

U.S. ARMY AVIATION SCHOOL LIBRARY

COVER

The Piaggio-Douglas PD-808, certificated by the FAA last November, is a Douglas design manufactured in Italy by Rinaldo Piaggio. See page 13.

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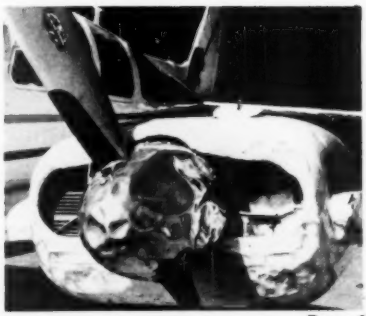

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The Snows Are Melting

spring tune-up time is here

In France they say *printemps*. The Germans mean the same thing when they say *fruhling* and *prima vera* will get the message across in any Italian or Spanish speaking region. But no matter how you say it, it all means spring, that lovely time of the year that signals the start of another flying season for many pilots grounded by winter.

It is also the time for a critical going-over of aircraft stored for long periods in hangars and outdoor tiedown. While the owner is away, the mice, and a host of other denizens of the wild, sometimes set up light housekeeping in the snug interior of aircraft. Birds seem to fancy air scoops as proper places to raise their broods; rodents, including squirrels, find upholstery, cushions and blankets just the ticket to pass the long winter months.

Animal excretions are highly corrosive to aluminum alloy and harmful to wood and fabric. Small animals have been known to eat fabric and ribstitching, making wings unsafe. Plastic tubing and wire covering seem attractive food for hungry animals. The first clue to animal habitation is odor; next look for bits of vegetation used in nesting and ripped upholstery.

Insect nests obstruct fuel lines and tank vents and cause fuel starvation and dangerously lean mixtures. They also plug pitot tubes and static vents.

Because of possible animal habitation, before you take your plane out of storage this spring, pay special attention to:

- Oil coolers—intake scoops.
- Carburetors—intake screens and passages.
- Fuel tank vents—free of obstructions.
- Pitot tubes—free of obstructions.
- Fuselage—interior and baggage area.
- Wings—interior of wings and control surfaces.
- Static vents—free of obstructions.
- Remove winter shields on engine cooling openings. If this is not done, the engine can become dangerously overheated.
- Change oil to proper viscosity.
- Drain fuel pumps and strainers. Check carburetor strainer and bowl for sediment and water.
- Drain fuel tanks completely to eliminate moisture and foreign material and then flush with clean gasoline.
- Check idle RPM and reset for spring operation. Engines will idle faster in warm weather than they will during the winter.
- If aircraft has diaphragm fuel pump, check to make sure the diaphragm has not dried out during inactive winter months. Pump will not function properly if this condition exists.
- Replenish hydraulic reservoirs.
- Check fabric surfaces. Look for "hangar rash" or other damage. This includes cuts, dents, damage to externally mounted components and other evidence of mishandling.
- Check battery condition, fluid level, state of charge, condition of terminals, security of mounting.

Spring is a natural time to clean up, but this shouldn't be just a once-a-year thing. Federal Aviation Regulations require aircraft to have an annual inspection by a licensed mechanic holding an inspection authorization, a certified repair station or a manufacturer authorized to conduct inspections. However, the FARs also provide for a *progressive* inspection.

THINGS TO DO:

- Before starting, have proper tools in good condition.
- Plan your procedure, using an inspection check form.
- Do the job thoroughly; don't pass up any inspection plates, cowling or fairing.
- Clean as you go along, using approved solvents under ventilation conditions specified by the manufacturer.
- Lubricate all moving parts, but don't overdo it.
- Check all safeties—wire, cotter pins, lock nuts, etc.
- Resafety a part you have unsafetied *before* inspecting the next item.
- Mark with a bright tag the site where a part is removed "temporarily." Tag should note full description of removed component, reason and date of removal. This also applies to disconnected linkages.

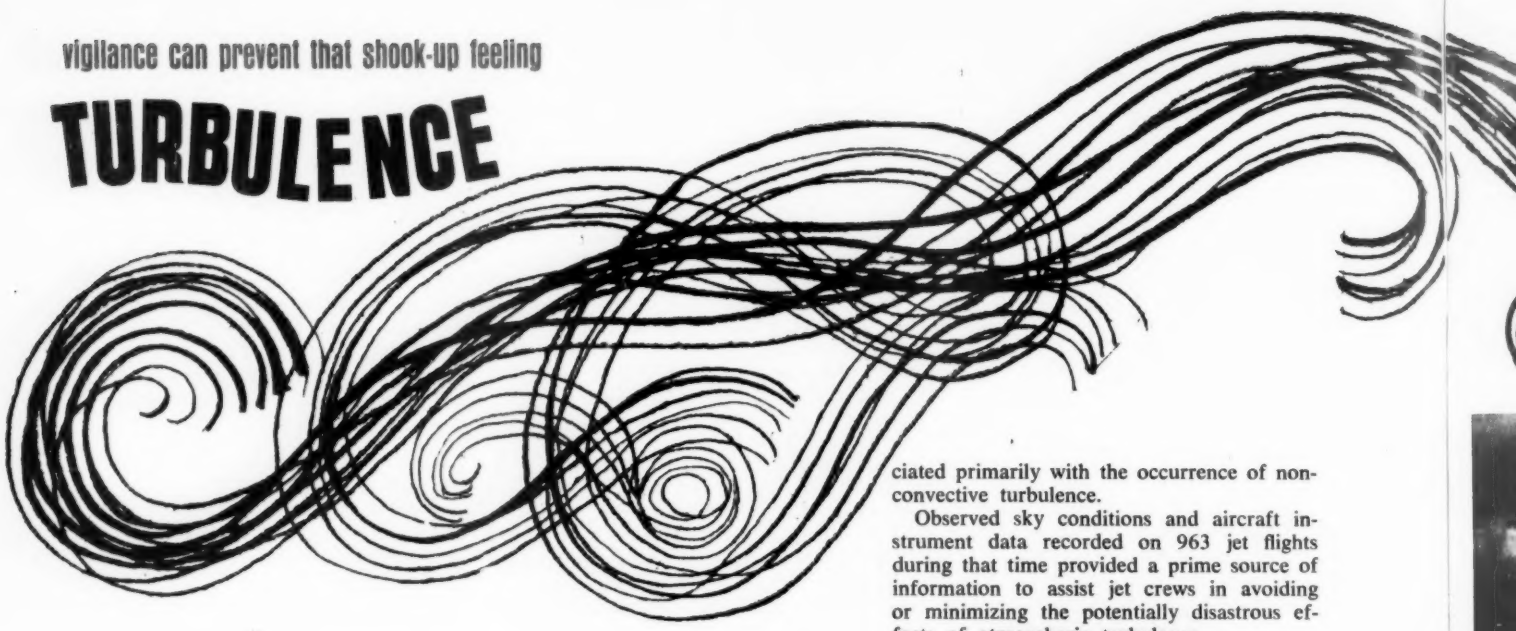
DON'T

- Check landing gear by kicking it—this only hurts the toes. Raise gear off the ground.
- Zip through the check list. Take plenty of time.
- Move the propeller unless the magneto switch is in the "Off" position or the ignition system is otherwise rendered inoperative. Even so, be *wary*.
- Gloss over inspection points just because they are hard to get at.
- Make assumptions about the airworthiness of a part without following the prescribed inspection procedure.
- Let false pride prevent you from asking questions—no one is expected to know everything about everything. When in doubt, ask an expert.

After you are certain that your aircraft is in top shape, there is still one other major factor to be considered—the shape of the pilot. Rusty performance like a rusty part has no place in aviation. After a winter layoff, don't hesitate to check your proficiency with a qualified instructor before taking off on that special trip you've been planning.

vigilance can prevent that shook-up feeling

TURBULENCE



The farmer strained as he hauled the second 70-pound bale of hay from the rear of his station wagon. He paused a moment to mop his brow. It was warm for a November day.

His gaze turned skyward. A blanket of thin stringy clouds reached to the eastern horizon and a high flying jet left a pair of white tails to the west showing where it had been. Farther back they merged and began to dissipate, caught up in the strong winds of the jet stream.

Inside the cockpit, the jet captain scrutinized the sky. He decided to play it safe and contact the center controller requesting a change in altitude. A few bits of terse communication later he adjusted his controls to climb and leveled off at his cleared FL-370. After all, playing it safe was part of his business, and there was a good possibility of running into some window-rattling turbulence down below.

What made the pilot ask for a change in flight level was the appearance of that band of wispy cirrus clouds at about two o'clock. Correlating the appearance of cirrus with instrument observation of a gradual change in temperature while in cruising altitude helped make up the pilot's mind. He had recognized the symptoms of high altitude turbulence associated with the jet stream core and cirrus clouds.

Aircrew recognition of impending flight conditions from observing sky conditions and cockpit instruments can mean the difference between a safe comfortable flight and getting "all shook up." Since December 1960, the meteorology department of Eastern Air Lines, independently and under contract to the FAA and the Weather Bureau, has conducted a weather research program making in-flight examination of meteorological factors associated primarily with the occurrence of non-convective turbulence.

Observed sky conditions and aircraft instrument data recorded on 963 jet flights during that time provided a prime source of information to assist jet crews in avoiding or minimizing the potentially disastrous effects of atmospheric turbulence.

Still Many Unknowns

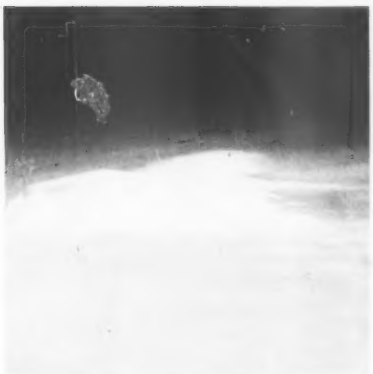
There are still many unknowns concerning the detection of turbulence, particularly the clear air variety. However, inflight observations indicate that turbulence can be avoided under certain conditions of clear skies, in or near cirrus clouds, and associated with flight instrument changes. Following are some of the findings:

- Generally a 2,000 to 4,000 foot change of altitude above or below the tropopause will prevent encountering turbulence. Tropopause inversion is indicated by change of color at the horizon from pale gray-blue to light blue in daytime or dark gray to black at night in moonlight.
- In mountain wave conditions the distance should be extended to 4,000 feet below and 5,000 feet above the tropopause.
- Moderate turbulence can be expected above 30,000 feet when crossing a ridge of high pressure south of a subtropical jet stream with anticyclonic curve pattern; smooth or light chop conditions usually exist below 30,000 feet.
- Light to moderate chop often occurs 500 nautical miles or more downwind from a rapidly developing surface storm center and south of a polar jet stream, with minimum turbulence below 30,000 feet.

Flight Conditions—Cirrus Clouds

- Moderate or greater turbulence may be expected in the *top* two-thirds of dense *polar* jet stream cirrus with light turbulence elsewhere in the cloud layer.
- Moderate or greater turbulence may be encountered in the *bottom* two-thirds of dense overcast *subtropical* jet stream cirrus with light turbulence elsewhere.
- Light to moderate chop may be expected in the clear area, or in thin layers of clouds extending from the overcast base to 3,000 feet below subtropical jet stream cirrus.
- Light to moderate chop is often found

While only the waterspout indicates funnel cloud activity, the vortices indicated on the water are capable of producing turbulence between the surface and the cloud.



A well-defined cutoff edge of a jet stream cirrus is shown above. Left, the cap of a cirrus cloud, resembling a mountain wave lenticular cloud, formed when the thunderstorm is at its most active and most turbulent stage.

between overcast layers of cirrus, as well as in the cloud when the separation between layers is 2,000 feet or less.

Extensive cirrus cloud formations occur in convective thunderstorm cells during late spring to early fall. As the cell builds rapidly to heights often above 40,000 feet, relatively thin layers of uncondensed moisture present in the atmosphere are suddenly lifted to higher altitudes where a visible ice crystal cirrus cloud forms. The winds aloft, together with the vertical developments of the storm cell, produce a rather smooth and well-defined "thunderstorm lenticular" cloud. Thunderstorms of air mass, frontal and squall line origin have been observed to produce this type of cirrus cloud. Flight altitudes less than 5,000 feet abve the top and above the tropopause or within 20 nautical miles of the radar echo should be avoided because of possible severe turbulence.

In-flight observations of unusual instrument changes and rates of change will indicate probability of clear air turbulence. In the Mach .75-.80 cruising airspeed range, a rate of temperature change of 1 degree C. per minute with a total change of 2 degrees C. has proven to be the most effective criteria for detecting impending turbulence with moderate or greater intensities.

These are minimum values—faster rates of change and larger total amounts generally indicate greater intensities. Direction of change does not appear significant; either increase or decrease will indicate evidence of turbulence detection. Of course, atmospheric temperature changes can be useful in detecting clear air turbulence only during the cruising altitude portion of the mission, with a constant indicated airspeed.

Pilot recognition of the symptoms through observing sky conditions and instrument readings, coupled with preflight weather briefing and in-flight pilot-to-forecaster information, can mean the difference between a routine flight and getting "all shook up."

Within the past year a high-level interagency Government group has been investigating the clear air turbulence (CAT) phenomenon. The National Committee for Clear Air Turbulence, headed by the Departments of Defense and Commerce and including the FAA among others, concluded a study in December 1966 which recommended that a National CAT Data Collection project be established to provide an interagency operational task force for gathering data.

It recommended that the Department of Defense have primary responsibility for measurements and observations, NASA for pilot/aircraft response, the Department of Commerce for forecasting and the FAA for dissemination. The Federal Coordinator for Meteorological Services and Supporting Research would have responsibility for overall coordination. The report is available from the Superintendent of Documents, Government Printing Office, Washington, D. C. 20402, price 35 cents. *By Francis J. Brandl*

Vest Pocket Aviation Library

FAA control towers and flight service stations are as familiar as the corner drug store to most general aviation pilots. Moreover, many use their aircraft radio as often as they hear the evening news on TV and, it's a known fact, pilots are forever talking about weather. As a result, they all have an idea about how the FAA's air traffic system works.

But despite—or maybe because of—their familiarity with the subjects, pilots find pamphlets on these topics put out by the FAA Aeronautical Center at Oklahoma City of great interest. The publications give pilots useful information in capsule form. Take **The Control Tower** leaflet for example. It takes less than four minutes to read the list of 10 good operating practices—use your radio, listen carefully, give aircraft type, etc., and presents a series of points to remember: Never taxi closer than 100 feet to an active runway unless authorized by the tower, always specify the frequency on which you expect a reply, and the like.

The Flight Service Station leaflet is just as brief, and covers such subjects as preflight service, inflight service, airport advisory service, future service, and emergency service. It includes the following points to remember: File a flight plan, file an arrival report, report delays.

You and Your Radio urges pilots to use their radios. It follows private pilot Bill Jones on a flight from Williamsburg to Skyatook, flying a light plane equipped with a standard VOR receiver with a crystal controlled transmitter. Among the 10 points to remember are these: Be sure you have selected the right frequency, advise the tower or station of the frequency on which you are expecting a reply, keep your contacts as brief as possible.

In **You and Your VOR,** the VOR (Very High Frequency Omnidirectional Range) is described, in five short pages, as the backbone of the Federal airways navigational system.

Pilot's Weather: How It Is Forecast, which runs 14 pages, was adapted from the comprehensive 300-page book, **Aviation Weather,** published jointly by the Weather Bureau and the FAA in 1965 and sold for $2.25 by the Superintendent of Documents, Government Printing Office, Washington, D. C. 20402. It points out the capabilities of present-day meteorology and discusses both the reliability and limitations of weather forecasting.

Another leaflet touching on weather is **Radar Sees the Weather.** Pointing out that "radar today is one of our foremost tools for weather observations and short range forecasts," the leaflet explains how radar works and how radar information is used in aviation. There is also a section on research.

The most comprehensive booklet in the FAA Aeronautical Center group is "designed for use in facility familiarization courses conducted by the FAA Academy" at Oklahoma City. Called **Flight, The Story of Electronic Navigation,** the 41-page booklet was designed to give the reader "a general knowledge of the air navigational system" so that he may "better understand the services given by the men and facilities of the FAA."

Three other pocket-size leaflets carry titles which, like the others, indicate the subject: **Air Traffic Service, U. S. A.; FAA Aeronautical Center** and **A Glossary of Aeronautical Terms** which carries more than 70 entries ranging from "Advisory Service" to "Warning Area."

All publications are free. Write to the Office of Public Affairs, FAA Aeronautical Center, P. O. Box 20582, Oklahoma City, Okla. 73125.

traveling college of AERONAUTICAL KNOWLEDGE

A congenial, square-rigged, substantially-built citizen called Pete had a very select group standing in the aisles, whistling and shouting "more, more" when he appeared last November at Las Vegas.

J. W. (Pete) Campbell was not a featured performer at a plush watering hole on the Strip. Nothing like that. Pete is anchor man on a FAA flight instructor refresher team operating out of FAA's Aeronautical Center, Oklahoma City.

Those who have seen and heard his presentation on aircraft instruments and performance call him an evangelist of air safety and a wizard at getting his point across. The same might also be said of his two fellow instructors, James E. Shelly, who teaches aviation psychology, and Carl L. Eminson, who holds forth on flight maneuvers.

The trio, who were on the road more than 115 days last year (not counting actual travel time), were joined by another, newly formed group early this year.

Operating under the banner of FAA's Flight Standards Service, the flight instructor refresher program aims to increase flight safety by improving the skills of the key man—the instructor who takes the novice from fledgling to licensed pilot. The FAA has reason to suspect that fully 80 per cent of all reported flight accidents are at least partially due to shortcomings which could be corrected by improved flight training.

It has been long recognized that flight instructors welcome *authoritative* training and guidance. But they are busy men, struggling for a living in a highly competitive industry. They will not and can not spare time for refresher courses unless they get something back, something that will make their job easier and safer.

This was the guiding principle around which the FAA organized and built its original flight instructor refresher program back in 1962. The first clinic, a 10-day affair with 20 participants, met in March 1962 at Great Falls, Mont., under the sponsorship of the Montana State Aeronautical Commission. That year, 85 flight instructors sharpened their skills. Since then, 2,291 instructors have attended the refresher program. More than half participated in 1966. Clearly, the program has proved to be something of value to the hard pressed flight instructor.

The FAA does not sponsor the clinics—that is done by state aviation departments and a growing number of other nongovernmental groups, notably the Aircraft Owners and Pilots Association. Nor does the FAA have the aircraft or time to fly all the instructors who attend the clinic—that is done under individual *sponsor* arrangement. However, the FAA team, assisted by local GADO pilot examiners and state officials, do participate in in-flight standardization in sponsor aircraft to polish flight instructor understanding of flight maneuvers discussed during the ground school lectures.

The present aim is to beef up the FAA team which, with the aid of industry, will be able to bring up-to-date flight instruction procedures and techniques to 10,000 instructors yearly. On the drawing board are plans to accommodate annually as many as 12,000 out of the 24,000 active certificated flight instructors in the country. Since instructor certificates must be renewed every two years, this would provide a convenient means to satisfy one of the prerequisites for renewal.

The FAA charges no fee for its participation, but sponsors have varying prices, the average being $35. But the FAA does offer a bonus, free of charge, to all who attend clinics—a 10-volume kit of the instruction books used in the course.

Setting up a flight instructor refresher program is no problem. Interested persons need only contact the nearest FAA general aviation district office, by letter or in person, to start the machinery rolling. This is not to say that every request will be granted. Each will be weighed on its merits, the determining factors being the availability of instructors and the number of trainees involved. In many cases several small neighboring clinics are combined into one large and effective one.

When the Clouds THROW STONES

The ra-a-tat-tat of hail pelting the tin roof of a vacation hideaway is a melodious sound to those sheltered snugly inside. Move the "tin roof" upward a few thousand feet, as in an airplane, and the warm feeling of security evaporates as the staccato tempo increases.

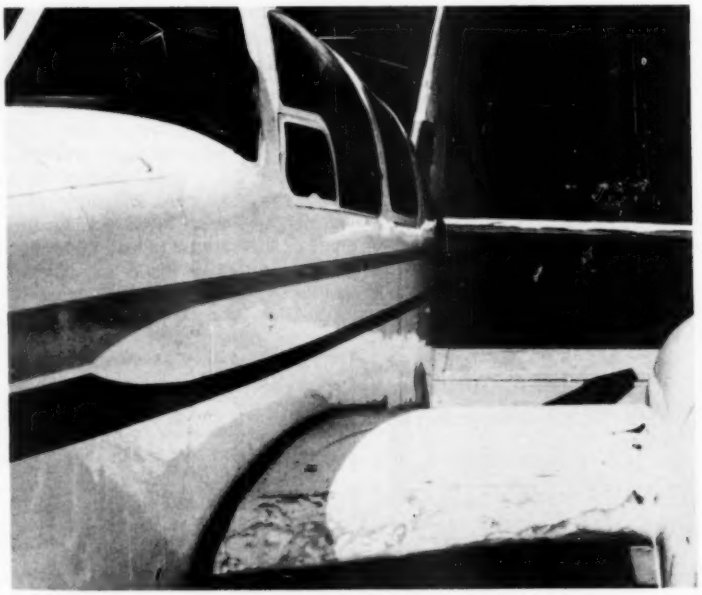
Every year planes are damaged by hail while in flight with results that are sometimes disastrous. You may be certain of one thing; if you encounter hail, it came from a thunderstorm. But you don't have to be flying in a thunderstorm or even in clouds to run into it; sometimes you can be quite a distance from the thunderstorm that produced the hail that suddenly bombards your plane. Air Force records tell of a KC-130 tanker that suffered damage requiring several hundred man-hours to repair after a bout with hail in clear air while several miles from two thunderstorms the aircraft was flying between.

There is a lot that isn't known about hail. But we do know what it is—a pellet of ice, generally opaque, seemingly of a layered structure, generally quite hard. The pellets—or hailstones—come in many sizes ranging from buckshot size up to baseball and grapefruit size and occasionally even larger. Nearly everyone has seen hail and can recognize it. Weathermen have developed some rather reliable rules that tell them when conditions are right for thunderstorms to produce hail and even approximately what size the stones are likely to be.

However, it is not yet possible to forecast with precision when or where thunderstorms will form, which ones will produce hail or where the hail will fall. There is considerable evidence to indicate that hail is present within nearly every thunderstorm during some stage of its development. Therefore, a pilot who penetrates thunderstorms runs a much greater risk of encountering hail than one who avoids them.

There are several theories as to how hailstones are produced. This is because not enough is yet known about what actually occurs inside a thunderstorm to bring all meteorologists into agreement.

Scientists are agreed that strong updrafts are needed to form hail and that the strongest updrafts are associated with the most intense (and generally the tallest) thunderstorms. There is disagreement as to whether hailstones are carried aloft by updrafts or whether the updrafts merely retard the fall of the hailstones. There is agreement that the hailstones grow in size by colliding with water drops. Water may remain liquid at temperatures as low as minus 40 degrees Centigrade, so within an intense thunderstorm having an enormous number of water drops, it is relatively easy for hail-



storms to increase in size through collision.

Hail is most frequently encountered at altitudes between 10,000 and 15,000 feet. However, reports show that one-inch hailstones have been encountered at 45,000 feet and two-inch hailstones have been encountered at 35,000 feet. Of course, in-flight encounters may occur anywhere between the surface and above 45,000 feet. As a rule the inflight encounters with hail are of short duration, since "hail shafts" are small compared to the size of a thunderstorm and the speed of the aircraft usually carries it through the shaft in a matter of seconds.

Weather radar, both ground based and airborne, is adding to what we know about thunderstorms and hail. Ground-based, long range radars used by the Weather Bureau (WB) for storm detection and surveillance provide excellent information for flight planning to avoid thunderstorm areas. Storm intensity, movement, height and rate of development can all be determined with good precision by WB radar. When properly used, airborne radar can serve to help a pilot pick his way around the most intense storms. By steering clear of the most severe centers of activity the pilot may avoid hail.

In using airborne radar the pilot should avoid echoes that are very strong and those having sharp or scalloped edges or well-defined hook shaped protuberances. Another danger is that echoes from a nearby thunderstorm may hide storms that are farther away.

There is only one fail-safe rule for avoiding an in-flight encounter with hail —don't fly in thunderstorm conditions. Since that is too broad a rule to apply across the board, a pilot's best bet is to know and understand weather as much as possible. (See "Thunderstorms," *FAA Aviation News*, June 1966.)

Lack of precision in forecasting hail has led to development of some rules of thumb pilots can use to avoid hail when flying in thunderstorm situations. They include:

(1) In general, the higher the storm cloud, the greater the likelihood of hail. In a thunderstorm condition or in a line of storms avoid the vicinity of the tallest ones.

(2) Hail has been encountered in clear air some miles away from the parent thunderstorm cloud. This has led the WB to recommend that pilots stay at least 15 miles away from the storm center. This may not guarantee safety, but there is no record of encountering hail at that distance.

(3) Hail will generally be carried by the upper winds, so fallout areas will generally be in advance of the storm.

(4) Intense thunderstorms may be indicated by frequent lightning, rapid growth of clouds and rapid changes in cloud shapes.

(5) Hail is more often reported in the spring than later in the year, but it may occur at any time. Also, hail is more often observed north of the 30 degree latitude than south of it. This includes all of the United States except Hawaii and parts of Texas, Louisiana and Florida.

This Beechcraft Baron was flying IFR at about 11,000 feet near Kirksville, Mo., when it was hit by a violent spring hailstorm. The windshield was shattered and the pilot, Roy W. Pearson of Holdrege, Neb., suffered head injuries when he was struck by hail and flying debris. His son Michael, holder of a private pilot certificate with single-engine rating, was sitting in the right hand seat and took over the controls. Though Pearson recovered soon enough to land the damaged aircraft, when he was in the hospital he became paralyzed from his head to his waist for more than a week. Pearson is now able to fly again and the Baron, rebuilt, is flown by a Sioux Falls, S. D., firm.

famous

FLIGHTS

the long night of the Lone Eagle

Overnight he is transformed from an obscure air mail pilot into the most famous aviator the world has ever known.

At the age of 25, he accomplishes what no man has ever done before—flies nonstop from New York to Paris, a distance of 3,600 miles across the unfriendly waves of the Atlantic Ocean.

Moreover, he does it *alone*—flying a single-engine silver monoplane called the *Spirit of St. Louis.*

Within weeks, others follow him across the North Atlantic—Clarence Chamberlain and Charles Levine in a single-engine Bellanca and Cdr. Richard E. Byrd and a crew of three in a trimotored Fokker—but their flights lack the skill and, especially, the daring of the original. They are little noted and quickly forgotten. The day belongs to the boyishly handsome young man the newspapers call the "Lone Eagle."

President Coolidge dispatches the cruiser *Memphis* to bear the hero home to Washington. He is given a triumphant parade down historic Pennsylvania Avenue and presented with the Distinguished Flying Cross by the President himself in a ceremony on the Washington Monument grounds. Later in the year, both Houses of Congress will approve unanimously a bill awarding him the Medal of Honor.

The next stop is New York City, where his reception borders on mass hysteria. From the Battery to City Hall to St. Patrick's Cathedral to Central Park, he is carried through the streets of the city. An estimated four million people jam the line of march. Confetti fills the air like dust in a Kansas wind storm.

It is in New York also that he receives the Raymond Orteg prize of $25,000 established in 1919 "to be awarded to the first aviator who shall cross the Atlantic in a land or water aircraft (heavier-than-air) from Paris or the shores of France to New York, or from New York to Paris or the shores of France, without stop." Later, he will pick up another $25,000 from the Woodrow Wilson Foundation for the contribution his flight makes to international friendship.

The following month, he takes the *Spirit of St. Louis* on a 22,000-mile flying tour of the country for the Daniel Guggenheim Fund for the Promotion of Aeronautics. In three months, he visits all 48 states, stops in almost 100 cities and towns, and comes face-to-face with an estimated 30 million Americans.

Good will flights to Mexico and other Latin American countries follow, and then the *Spirit of St. Louis* is retired. On April 30, 1928, it flies for the last time from Lambert Field in St. Louis to Bolling Field in Washington, D. C., where it is presented to the Government.

Today, this remarkable airplane—built especially for the transatlantic flight in just 60 days by the Ryan Company of San Diego—hangs in Washington's Smithsonian Institution, looking much as it did on that historic day almost 40 years ago. . . .

The date is May 20, 1927, and the *Spirit of St. Louis* is poised for flight at New York's Roosevelt Field. The sky is beginning to clear after an all night rain, but the field is still soft and soggy. All agree that take off will be difficult; some even say impossible.

The *Spirit of St. Louis* is not an airplane at all, but a flying fuel tank. This day it carries 450 gallons of gasoline—150 more than it has ever lifted before. Everyone remembers that René Fonck crashed in flames on this same field only eight months before while taking off in a heavily-loaded Sikorsky trimotor on a projected transatlantic flight.

At 6:52 a.m. (EST), the aircraft begins to move—sluggishly at first, then slowly gaining speed. One, two, three, four times the wheels leave the ground—and return. Only a thousand feet of runway remains, and at the end a web of telephone wires looms higher. Then the plane is in the air again—5 feet—10 feet—20 feet—40 feet—wires flash by underneath—20 feet to spare.

Now the pilot is alone without direct contact with the world below. There are only the sightings reported breathlessly in the press and on the radio. At 9:15 a.m. he is over Middleboro, Mass., at 11:45 over Tusket, Nova Scotia; at 3:45 p.m. over Cape Breton Island. Then, shortly before sunset, he swoops low over St. John's Newfound-

land, and flies out through the harbor. North America is left behind. Ireland is 2,000 miles ahead.

It is the longest night of his young life. Sleep, even more than weather, is his enemy. To keep alert, he sticks his hand through the open cockpit window and diverts a stream of air against his face until his fingers numb; he stomps his feet on the cockpit floor until his leg muscles ache; he works intricate navigational problems in his head until his mind fogs. The sun is long in rising.

In the 27th hour of flight, he sights a fleet of small fishing boats on the water below. With engine throttled back, he dives within 50 feet of one of them and shouts, "Which way is Ireland?" A head appears in a cabin porthole, but there is no reply.

A short while later, the Irish coast appears like a dark cloud on the northeastern horizon. He cannot believe it. He is more than two hours ahead of schedule and, in a triumph of dead reckoning navigation, almost exactly on course. Paris is a scant 600 miles away.

The rest is easy. After passing over the coast of France at Deauville, he celebrates with a meat sandwich—his first food since take off. It is flat and tasteless, and he must wash each mouthful down with water. But soon, up ahead on the dark horizon, is a faint glow—Paris, the "City of Light."

Exactly 33 hours, 30 minutes, 29.8 seconds after leaving Roosevelt Field, he lands at Paris' Le Bourget Airport and is greeted by a tidal wave of delirious Frenchmen who flood through police lines and surge across the field chanting his name.

The name, of course, is Lindbergh—Charles A. Lindbergh. *—By John Leyden*

Cockpit of the **Spirit of St. Louis**

no rocking chair for her

One day last summer—as nonchalantly as if she were heading for the neighborhood supermarket—Marion Rice Hart boarded her single-engine *Bonanza* at Washington National Airport and flew to Presque Isle, Maine. There she waited for the first nice day.

When it came, on July 8, Mrs. Hart climbed into her airplane, placed a few rolls of Life Savers and a sandwich beside her, and strapped herself in for the first leg of an aerial odyssey that took her across the Atlantic, throughout Europe, behind the Iron Curtain and island-hopping in the Mediterranean.

Two months and 20,000 miles later, Mrs. Hart returned home, just in time for her birthday. Her 75th!

The New York Times reported her 15½ hour transatlantic flight in six sentences. Newsworthy to the *Times* was not her flight, but her age. The blasé manner in which transoceanic flights are regarded today—even those made by elderly ladies in small planes—contrasts sharply with the tumult that accompanied Lindbergh's feat 40 years ago. And unlike the frenzied welcome Lindbergh received at Le Bourget, no one particularly noticed the spry, red-haired lady as she got out of her plane at the Glasgow Airport. The flight probably would have been disregarded except that six days later an English friend telephoned a London paper. For her own part, Mrs. Hart managed to keep the trip a secret until she was three-quarters of the way across the Atlantic: "I didn't want any arguments from my family about whether I should go."

It is hard to believe she would have been constrained by their objections. Tolerantly bearing the hackneyed label of "America's flying grandmother," she is about as grandmotherly as Auntie Mame. Sprightly and independent, she not only has the energy of youth, but also the resources of age. She could be described as a mature pixie.

Pasted to the wall of her Washington, D. C., apartment in the city's fashionable Foggy Bottom area is an unframed world map. Red and green lines zig and zag from continent to continent. The red ones trace her aerial expeditions—over the Andes, beyond the Himalayas, above the African jungles. The green markings chart her nautical voyages. On a single trip she logged 30,000 miles when she skippered and navigated a 72-foot ketch around the world.

What is astonishing about these exploits is not their magnitude, but their timing. Almost all of her aerial and high seas adventures have been compressed into the last third of her life. She did not even take up flying until she was in her mid-50s.

Marion Hart's appetite for action and adventure belie her gentility. She is as much at home writing poetry and sculpting objets d'art as she is selecting OMNI frequencies. She spends as much time absorbed in historical biographies as she does poring over Jeppeson charts. Feminine, she is not a feminist.

She is skeptical of women who have no other reason for venturing into traditionally male domains than the sheer principle of equality. An MIT graduate shortly after the turn of the century, she recently was asked if she was the first female chemical engineer in history. Her answer? "I don't know."

She is, however, a loner—not so much because of her own deep-rooted nature, but because of sheer practicality. How many women her age share her enthusiasms? She is buoyant and spirited. If Lindbergh's life is an epic, then Marion Hart's is a lyric.

Above all, she is uncomplicated. When asked if she didn't have to agree that it was highly unusual for someone her age to have made such a long flight, she observed: "It's the age of the engine that matters, not the age of the pilot."

—By Sue F. Silverman

NAFEC Controllers Use 'Private Eye' to Scan Runway

Rugged is the word for this TV camera under test at NAFEC. Fully controllable from a remote point, camera can tilt, pan and "zoom." Technician checks receiver in laboratory before tower installation.

Controllers in the tower at Atlantic City Airport are watching TV on the job, but it's all part of the day's work.

The FAA is testing a TV camera sited near the main runway of the airport which is the home of its test center, the National Aviation Facilities Experimental Center. Purpose of the television is not to watch pilots or see how they handle their planes, but to study how useful a closed circuit TV might be to air traffic controllers in the airport tower.

The TV enables controller to "peek around" corners not usually visible from the tower and to get a better view of some ground traffic—taxiing airplanes as well as ground vehicles including construction and maintenance equipment.

The system under test at NAFEC is composed of several components assembled by the FAA. The camera is solid state with a very high resolution improved zoom lens. This means more range and a clearer presentation.

Active since November, the tests are investigating remote control, effect of weather on the TV equipment and operations at low light levels.

Airport Aid Report Covered in FAA Publications

How to get future Government funds to develop public airports and where the past funds have gone are the subjects of two free FAA publications.

An 11-page fact sheet tells how the Federal-Aid Airport Program (FAAP) works, who is eligible and how and where to apply. The more elaborate 72-page pamphlet gives a detailed dollar accounting of where the money was allocated for the fiscal year ending last June 30.

The FAAP program had 1,633 active projects representing allocations of $390.85 million on the books at the end of fiscal 1966. Allocations of $101.3 million were made that year for projects at 491 locations. The remainder of the projects were funded earlier.

Runway Extensions Needed

Airports with scheduled airline jet service increased from 70 to 111 in calendar year 1965. By 1970 the FAA estimates that an additional 234 airports will need this service. To meet the 1970 requirements, the FAA estimated that runway extensions equivalent to 650 miles of single-lane highway costing more than $130 million will be needed. Beefing up existing runways will cost another $41.5 million.

The FAA estimated the cost of improvements required in the next five years to accommodate jet aircraft at communities which currently do not have such service will be more than $200 million.

Report to Congress

The FAA summary, an annual report to Congress on expenditures under the Federal-Aid Airport Program, lists all FAAP projects on which grant agreements were completed during fiscal 1966 and includes a brief description of each.

A limited number of copies of both publications are available without charge. Requests should be accompanied by a self-addressed mailing label. For the "Fact Sheet: Federal-Aid Airport Program," write to the FAA, IS-10; for the "Federal-Aid Airport" pamphlet, write to FAA, HQ-438, both at 800 Independence Ave., S.W., Washington, D. C. 20553.

General Aviation Sets Pace in Surging Growth of U.S. Aviation

Americans took to the air in 1965 in unprecedented numbers, both as paying passengers in air carriers and as pilots of their own planes.

General aviation literally soared to new heights. In 1965 there were 37.9 million takeoffs and landings recorded by FAA-operated towers, 70 per cent of which was accounted for by general aviation. This amounted to 26.6 million operations—15 per cent greater than general aviation operations in 1964.

IFR Landings Increase

In instrument approaches, general aviation again scored new highs. Of 1,134,415 instrument approaches recorded by FAA towers in 1965, 265,151 were flown by general aviation aircraft—a 28 per cent increase over 1964.

All major criteria for measuring the growth of general aviation flying point to a continuation of the trend which has existed for more than 10 years. The eight percent gain in the size of the general aviation fleet during the 12-month period ending Dec. 31, 1965, is the largest increase since 1954. It resulted in a total of 95,442 eligible aircraft, compared with 88,742 on record at the end of 1964.

Active pilots increased from 431,041 in 1964 to 479,770 in 1965. Original issuance of pilot certificates during the year rose to 141,007 in 1965 as compared to 121,372 in 1964.

9,566 Airports on Record

Airports reported to the FAA increased to 9,566—public and private—in 1965, 76 more than in 1964 and 3,140 more than in 1960. Airports at 2,878 locations have runway lights; 2,747 have paved runways of which 1,235 are 5,000 feet or more in length.

Of the 12,646 civil aircraft shipments reported for 1965, 95 per cent were general aviation fixed-wing aircraft.

The above data was extracted from the *FAA Statistical Handbook of Aviation (1966)*, the standard summary of official statistical data on civil aviation activity in the U. S. The book is divided into chapters on the FAA, Airports, Federal Airways System, Aircraft and Airmen, General Aviation, Aeronautical Production, U. S. Carrier Operating Data, Airport Activity and Aircraft Accidents.

The publication may be purchased from the Superintendent of Documents, GPO, Washington, D. C. 20402, for $1.

$44.8 Million Contract Let by Agency for ATC System Modernization

A $44.8 million contract for automation equipment to modernize the nation's long range air route traffic control centers has been awarded to the Raytheon Co., Wayland, Mass., by the FAA.

The equipment, described as the Computer Display Channel (CDC) of the FAA's advanced National Airspace System (NAS), is a key element in the Agency's emerging semi-automatic air traffic control system. Automation will greatly improve the handling of flights by FAA's air traffic controllers.

The NAS system will free both pilots and controllers from tedious repetitive actions, permitting them to devote most of their attention and energy to their primary tasks—flying the plane and keeping flights safely separated.

The CDC, comprising approximately one-third of the equipment in an individual NAS installation, is the final link in a process which can provide the controller with what amounts to an accurate three-dimensional "picture" of planes in his jurisdiction.

Superimposed on the controller's radar scope will be electronically produced alpha-numeric tags which automatically follow flights through his control area.

Alpha-numeric tags consist of coded letters, numerals and symbols which not only identify each flight but also provide the controller with supplemental information. In today's system, by comparison, the controller must either memorize the identity of radar blips or write coded information on plastic markers. He moves the markers, called "shrimp boats," horizontally across his radar screen by hand. Keeping the marker near the moving blip helps the controller retain its correct identity.

Also, much of the supplementary flight information, such as altitude and destination of the flight, is now handwritten by the radar controller on paper flight progress slips.

The CDC equipment, on the other hand, puts most of the vital data needed by the controller in the alpha-numeric tag—on the same radar scope that shows second-to-second progress of flights. Eventually, automation will eliminate the need for flight progress strips altogether.

For aircraft equipped with automatic altitude reporting transponders, the alpha-numeric tag includes a continuous numerical readout, showing the actual altitude of the aircraft. In today's system, controllers view only a two-dimensional (range and bearing) radar picture of each plane's position.

Delivery of the first units is expected by mid-1968 with the first installation to be made at FAA's National Aviation Facilities Experimental Center, Atlantic City, N.J. The second is scheduled for Chicago.

Newest Addition to Executive Jet Fleet Is Certificated

The twin-engine Piaggio-Douglas PD-808 is the newest addition to the growing U. S. executive aircraft fleet. Designed by Douglas and built by Rinaldo Piaggio in its plant at Genoa, Italy, the PD-808 was certificated last November by the FAA's European Region.

The aircraft, which earlier had been called *Vespajet* and is now being marketed under the name *World Jet*, qualified for certification under Federal Aviation Regulation Part 21.29 (Issue of Type Certificate: Import Products) and Part 25 (Airworthiness Standards: Transport Category Airplanes).

Power is provided by two Bristol-Siddeley *Viper* jet engines with a thrust rating of 3,350 pounds. The PD-808 has a range of 1,070 nautical miles and a payload of 1,030 pounds with full fuel. True air speed is 480 knots.

U-2 Picked for High Level FAA Assignment

During a two-year test period, expected to begin in July, the USAF/FAA will make a series of high and low altitude data collection transcontinental flights over selected flight tracks. Objective of the flights is to determine whether existing air traffic control facilities —VOR, TACAN, VORTAC, ATC radar and UHF-VHF communications —are suitable for use at altitudes in which supersonic aircraft will operate.

An Air Force crew flying a U-2 reconnaissance aircraft equipped with special instruments will collect data at the higher altitudes, generally 70,000 feet, on the nonstop flights. Simultaneously, an FAA C-135, also equipped with navaid flight inspection equipment, will make concurrent flight tracks across the U. S. at altitudes below 40,000 feet.

Plastic Blocks May Provide Low-Cost Centerline Markers for Airports

Small plastic blocks, secured to the runway by epoxy adhesive, proved superior to center-line paint markings in tests involving four different aircraft types at the FAA's National Aviation Facilities Experimental Center, Atlantic City, N.J.

The reflective markers, mounted flush in the runway along the center-line, are four-inch square plastic blocks with beveled sides and a flat top. One-half inch high, the design permits aircraft to roll over them without damage to tires or to the blocks.

The reflectors, similar to those marking lanes on some highways, cannot replace runway lights but are considered a useful low-cost aid to pilots when taking off, landing or taxiing. Effectiveness of the markers varies with the location of the plane's landing lights. The NAFEC tests at Atlantic City indicated that lights mounted in the nose give the most effective results.

BRIEFS

• EXPANDED USE OF ELECTROCARDIOGRAMS and other diagnostic tests for determining the presence of heart disease are contained in an FAA proposal which would change periodic airmen medical exams. The proposal would provide better means of detecting signs of cardiovascular disease, which has been associated with recent airman fatalities. At a public hearing in Washington, D. C., in mid-February, various heart specialists testified generally in favor of the proposal, while representatives of ALPA and AOPA voiced dissent.

• THOSE LONG CRUISE BLUES aboard the destroyer U.S.S. Koiner might be a thing of the past, now that the ship has an FAA-approved pilot ground school. Believed to be the first of its kind, the school will be taught by a Naval officer and is open to crew members interested in flight. Tentative plans call for actual flight training at Agana, Guam, home base of the Koiner.

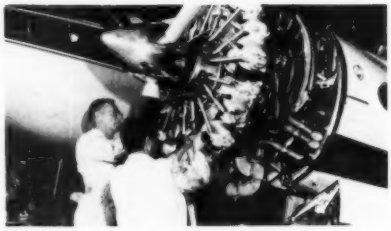
• "IT IS OBVIOUS that new engines must be substantially quieter than today's engines," FAA Deputy Administrator David D. Thomas told conferees at a symposium in Seattle on airport requirements in the 1970s. He said he thought the number one requirement should be an engine 15 to 20 perceived noise decibels quieter than today's engines. "We certainly are not thinking of today's noise level in terms of standards for future aircraft."

• DISORIENTATION. "Every pilot should consider his training incomplete until he has learned to fly by instruments and has gained proficiency in instrument flight techniques." The quote is from a pamphlet put out recently by FAA's Office of Aviation Medicine. Titled "Disorientation," the pamphlet also points out the value of trusting instruments. A second booklet is called "IFR, VFR--Either Way Disorientation Can Be Fatal." It gives the medical reasons why the inner ear can cause a pilot to make false interpretations regarding the aircraft's attitude. Both booklets are available without cost from FAA aviation medical examiners and general aviation district offices and, by mail, from the FAA Office of Aviation Medicine, AM-1, 800 Independence Avenue, S.W., Washington, D. C. 20553.

• FEDERAL AVIATION AGENCY becomes the Federal Aviation Administration on April 1 when the Department of Transportation officially opens its doors.

• PILOTS OPERATING FROM SMALL AIRPORTS located within the control zones of larger airports will be permitted to use flight visibility as the basis for operations if there is no accredited weather observer stationed at that field. The rule revising Part 91 of the Federal Aviation Regulations takes effect April 16. It allows pilots using satellite airports to determine the visibility at the field either from the cockpit while in flight or from the surface of the airport before takeoff.

Mechanics Safety Award Program Picks 36 Winners at State Level



The names of 36 general aviation mechanics have been announced as state winners of the Fourth Annual Aviation Mechanic Safety Awards program.

The FAA is now reviewing these state winners to determine regional winners. The latter names will be announced in April, along with regional winners in the air carrier competition.

The national winners—one from the general aviation group and one from the air carrier group—will be announced in May. They will each receive a $500 cash award and an all-expense trip to Washington, D. C.

The competition is jointly sponsored by American Aviation Publications, Air Transport Association, Flight Safety Foundation and the FAA, with cooperation from other elements of the aviation community.

The general aviation state winners are:

Alabama—James M. Hines, Dothan; **Arizona**—Henry E. Dubuy, Tempe; **Arkansas**—Forest Stolzer, Little Rock; **California**—Stanley Zurovski, Ventura; **Colorado**—Russell W. Spencer, Golden; **Florida**—Leopold V. Schaffer, Fort Lauderdale; **Georgia**—Donald Merkinson and Milford R. Miner, St. Simons Island; **Illinois**—Earl Maurice Adkisson, Tuscola; **Indiana**—Hollis G. Harrison, Laporte; **Iowa**—L. Lyle Hosleton (deceased), Brookfield, Mo.; **Kansas**—Virgil R. Ewy, North Newton; **Louisiana**—Jay Starr, Shreveport; **Michigan**—Claude Evans, Roseville.

Minnesota—Leslie W. Lewis, S. St. Paul; **Mississippi**—Ray Edward Thedford, Greenville; **Missouri**—David M. Starr, Florissant; **Montana**—Alan R. Eurich, Billings; **Nebraska**—Ralph W. Hawn, Papillion; **New Jersey**—Fred Hayunga, Wyckoff; **New Mexico**—Robert K. Love, Jr., Clovis; **New York**—Daniel Sclafani, Hartsdale; **North Carolina**—William S. Gardner, Morrisville; **North Dakota**—Phillip Miller, Valley City; **Ohio**—Edsaell W. Spears, Dayton; **Oklahoma**—Arthur Dubus, Enid.

Puerto Rico—Antonio Sandin-Garcia, San Juan; **South Carolina**—Walter F. Stokes, Greer; **South Dakota**—William Cravens, Pierre; **Tennessee**—Bert Walker, Memphis; **Texas**—Elric S. Friberg, El Paso; **Vermont**—Edwin H. Drew, Burlington; **Virginia**—William E. Jarvis, Richmond; **Washington**—George M. Brown, College Place; **West Virginia**—Jack W. Pell, Bridgeport; **Wisconsin**—Richard Ruland, Oshkosh.

FAA Aviation News welcomes comments from the aviation community. We will reserve this page for an exchange of views. No anonymous letters will be used, but names will be withheld on request.

• Light Stuff

Would it be practical to have flasher sockets or different colored lights on each side of the taxiway where it intersects the runway in order to expedite exit from the runway?

Memphis

The FAA has considered using blinking lights at taxiway-runway intersections, but opinion now is that these would result in confusion and create potentially hazardous situations. The disadvantages of the present blue taxiway edge lights for marking taxiway exits and intersections are recognized. This was the initial reason for establishing taxi guidance signs as a standard method of indicating exits, intersections and destinations.

Improved taxiway guidance is presently being evaluated. The FAA's efforts are directed toward providing taxiway centerline lights on the pavement surface. These lights can be used to indicate a visual path from the runway to the aircraft's destination.

• Needs a Hand

I am seeking correspondence with people who can help me locate technical and historical information concerning the Ryan Aeronautical Co. and its products. This information will be used in an article I am writing for the American Aviation Historical Society.

Everett Cassagneres
1210 Avon Blvd.
Cheshire, Conn. 06410

• License Not Lost

In regard to the regulation requiring the rerating of flight instructors: I hereby request a 60-day extension of my rating since I have not been actively instructing. I intend to attend a refresher course at ..... University as soon as the FAA approves this school.

The regulation suggests that its purpose is to upgrade all instructors. Since a refresher course will comply with the intent and purpose of the regulation, I feel my request for an extension of 60 days is a reasonable request. A denial of this request would place an unnecessary burden on me and would look like an attempt to discourage or eliminate instructors.

Name withheld

We surely don't want to discourage instructors. We're in favor of more and better instructors—not fewer and less qualified instructors. No extension of your certificate will be necessary, although it will expire as the result of your failure to apply for renewal before its expiration. It may be reinstated any time you successfully demonstrate to an inspector your current competency as a flight instructor.

• Looks Before He Leaps

I have a means of laminating documents with clear plastic and mounting them on a polished, quality wood plaque for hanging. I would like permission to make a facsimile of the actual FAA license in a size approximately 5 by 7 inches.

I would like to know:

- Can the license be legally reproduced in any form if it does not carry the signatures of authorization usually affixed at the bottom?
- Can the background of the FAA seal be used on the form?
- Can the "Blue Seal" instrument designation be reproduced?
- Would any or all of the above be acceptable if the information were furnished to me by the individual in a sworn, notarized statement?

Philadelphia

Yes, to all four questions. Where there is no fraudulent or criminal intent, the FAA has no legal objection to the framing of a facsimile or enlarged photographic reproduction of airman certificates, as you propose.

• Advertising Man

What steps do I need to take to get permission to tow a small banner behind my own personal plane? This will not be done on a commercial basis or for hire. I would do the towing to display the name of the company I manage and of which I am also part owner. It is my understanding that I require written permission to tow any object behind any aircraft.

Harrisonburg, Va.

The FAA will allow you to tow a banner behind your aircraft providing you secure a waiver from FAR 91.17(a). The FAA is concerned with the safety of persons and property on the ground, as well as of those in the air, and therefore has concern, among other things, about where you intend to drop the banner and about the type of hook you use.

While you have been sent applications for the waiver you request, you should contact an FAA general aviation district office. The one closest to you is at Byrd Field, Sandston, Va. 23150.

• Part Time Charter?

I would like to have some information on a charter service to be operated only during certain times of the year. This would include ski trips through the winter and a few week-long tours in the summer.

My understanding of FAR Part 135, "Air Taxi Operators and Commercial Operators of Small Aircraft," is that the operator must *own* the aircraft. I don't own one, but can make arrangements to get the type I need for the trip.

I want to know if it is legal to operate the type service stated above without a ATCO certificate or if there is some other certificate that would cover this service.

Boulder, Colo.

FAR Section 135.1(a)(1), which applies to the charter service you contemplate, requires you to have an ATCO certificate. While it would not be necessary for you to own an aircraft, Section 135 requires that each person holding an ATCO certificate must have exclusive use of at least one aircraft. The term "exclusive use" means having sole possession, control and use of the aircraft for flight either as owner or under a written agreement for its use and maintenance for at least six consecutive months. (See Section 135.31(b).)

If you have further questions, we suggest you contact the general aviation district office in the FAA Building Jefferson County Airport, Broomfield, Colo. 80020.

• Filing System

I would appreciate receiving information on the best way to file aircraft specifications and airworthiness directives. From my own experience and from what I have seen in other shops, I think this information would be of great help to a great many of the smaller operators.

Enterprise, Ore.

The FAA has not made specific recommendations on filing these items since it is the end use that determines the best way to keep them. The specifications are provided in looseleaf form and may be arranged to suit the user. The latest edition of the specifications was arranged by specification number which followed an alphabetical-numerical and numerical-alphabetical pattern. An alphabetical index is issued annually on Jan. 1 to reflect changes made during the previous calendar year.

The editions of the Summary of Airworthiness Directives are also provided in looseleaf form to allow the user to arrange them as he chooses. The summary is published in two volumes, with each volume arranged alphabetically by product manufacturers. A subject index listing the Airworthiness Directives (ADs) by manufacturer and model, and a numerical index, are included in each volume. Page revisions are currently issued annually to add ADs adopted during the previous year. A space is provided in the index for convenience in listing additional directives as they are issued on the biweekly AD card.

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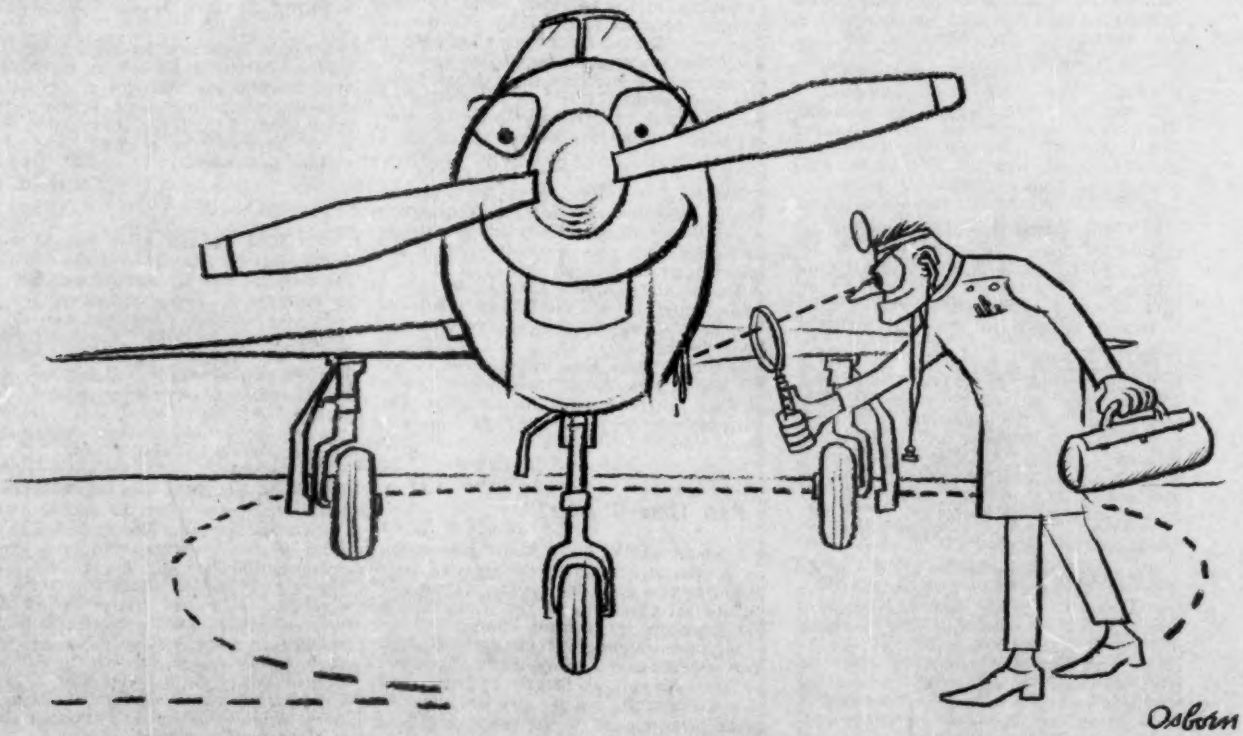
A "walk-around" too much trouble?



In the air, troubles double